CLAIM + DETAILED DESCRIPTION

[Claim(s)]

[Claim 1]In [are a heat-shrinkable-properties polyester system film, and] a main shrinkage direction, [warm water contraction of this polyester system film] In a direction which is 10 to 50% in treatment temperature of 70 **, and processing time 5 seconds, is not less than 75% in 85 ** and 5 seconds, and intersects perpendicularly with a main shrinkage direction, A heat-shrinkable-properties polyester system film, wherein it is 10% or less in 85 ** and 5 seconds and Young's modulus in 10 ** or less after contraction is below $2.3 \times 10^{10} dyn/cm^2$.

[Claim 2]The heat-shrinkable-properties polyester system film according to claim 1, wherein thickness distribution is 6% or less.

[Claim 3]The heat-shrinkable-properties polyester system film according to claim 1, wherein contraction stress in 90 ** is more than 1.0kg[/mm] ^{2}.

[Claim 4]A label of a full bottle whose compressive strength it is produced by one paragraph of the Claims 1-3 using a heat-shrinkable-properties polyester system film of a description, and is not less than 300g.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the suitable heat-shrinkable-properties polyester system film especially for a label use about a heat-shrinkable-properties polyester system film. In more detail, it is an object for the labels of a full bottle, especially an object for the labels of a glass full bottle, and the development of the wrinkle by thermal contraction, contraction spots, and distortion is related with very few heat-shrinkable-properties polyester system films.

[0002]
[Description of the Prior Art]As a heat-shrinkable-properties film, especially a heat-shrinkable-properties film for the labels of the drum section of a bottle, the film which consists of polyvinyl chloride, polystyrene, etc. is mainly used. However, about polyvinyl chloride, the chlorine-based generation of gas at the time of destroying by fire in recent years at the time of abandonment poses a problem, and there are problems, like printing is difficult and there is about polyethylene. In recovery recycling of a PET bottle, it is necessary to classify the label of resin other than PET(s), such as polyvinyl chloride and polyethylene. For this reason, the heat-shrinkable-properties film of the polyester system without these problems attracts attention.
[0003]The case where a heat-shrinkable-properties polyester system film is used is increasing in recent years for the purpose of the fanciness of bottle breakage prevention and a bottle as an object for glass bottles. It may be used as a full bottle label which sticks and uses a label for the whole glass bottle from the field of health nature and safety especially in it.
[0004]However, in use, glass bottle shape is complicated as a full bottle label of a glass bottle, and since there are many kinds, with the conventional polyester system heat-shrinkable-properties film, a problem may arise by contraction result. Especially as for the polyester system heat-shrinkable-properties film conventional in the case of the full bottle label of a thing with a large difference of the diameter of the bottle with a drum section with a thin taste portion, the shortage of contraction, etc. take place by the oral region of a bottle by a drink bottle. Contraction performances, such as high contraction, are required for the heat-shrinkable-properties film of use on such a full bottle label. In the case of the bottle for drinks, the case where label wearing and contraction are performed all over a drink restoration line for a productivity drive is increasing. Since a restoration line is a high speed, wearing of a label and contraction become high-speed and contraction time tends to become for a short time. Therefore, a heat shrinkage film requires the film waist which is equal to high-speed wearing, and the contraction performance which serves as high contraction for a short time.
[0005]Thus, a full bottle label use and also in high-speed wearing, the old polyester system heat-shrinkable-properties film of performance was insufficient.
[0006]
[Problem to be solved by the invention]This invention solves the above-mentioned problem. The purpose is an object for the labels of a full bottle, especially a heat-shrinkable-properties polyester system film for the labels of a glass full bottle, and providing very few heat-shrinkable-properties polyester system films has the development of the wrinkle by contraction, contraction spots, and distortion.

[0007]
[Means for solving problem][the heat-shrinkable-properties polyester system film according to

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(54) HEAT-SHRINKABLE POLYESTER FILM

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a heat-shrinkable polyester film for use as a label of a full bottle, particularly as a label of a full bottle made of glass and in which wrinkles due to shrinkage, shrinkage mottles, or strains rarely occur.
SOLUTION: The hot-water shrinkage percentage of the heat-shrinkable polyester film in a primary shrinkage direction is 10-50% at a treating temperature of 70°C.treating time of 5 seconds, and 75% of more at 85°C.5 seconds. And the degree of shrinkage in a direction perpendicular to the primary shrinkage direction is 10% or less at 85°C.5 seconds, and Young' modulus at 10°C or lower after shrinkage is 2.3×1010 dyn/cm2 or less.

claim 1] In the direction which warm water contraction of a polyester system film is 10 to 50% in the treatment temperature of 70 **, and processing time 5 seconds, is not less than 75% in 85 ** and 5 seconds in a main shrinkage direction, and intersects perpendicularly with a main shrinkage direction, It is characterized by being 10% or less in 85 ** and 5 seconds, and the Young's modulus in 10 ** or less after contraction being below $2.3x10^{10}dyn/cm^2$, and the above-mentioned purpose is attained by that.

[0008]The label of the full bottle according to claim 4 is produced using the above-mentioned heat-shrinkable-properties polyester system film, it is characterized by compressive strength being not less than 300g, and the above-mentioned purpose is attained by that.

[0009]

[Mode for carrying out the invention]An embodiment of the invention is described concretely below.

[0010]The heat-shrinkable-properties polyester system film of this invention is produced from the polyester which uses a dicarboxylic acid component and a diol component as a constituent.

[0011][as a dicarboxylic acid component which constitutes this polyester] Aliphatic dicarboxylic acid, such as aromatic dicarboxylic acid, such as terephthalic acid, isophthalic acid, naphthalene dicarboxylic acid, and alt.phthalic acid, adipic acid, azelaic acid, sebacic acid, and Deccan dicarboxylic acid, alicyclic dicarboxylic acid, etc. are mentioned.

[0012]As for content, when it contains aliphatic dicarboxylic acid (for example, adipic acid, sebacic acid, Deccan dicarboxylic acid, etc.), it is preferred that it is less than [3 mol %] (it is below the same to the total dicarboxylic acid component to be used). these aliphatic dicarboxylic acid -- more than 3 mol % -- the heat-shrinkable-properties polyester system film of the film waist at the time of high-speed wearing obtained using the polyester to contain is insufficient.

[0013]As for polyvalent carboxylic acid (for example, trimellitic acid, pyromellitic acid, these anhydride, etc.) more than trivalent, not containing is preferred. It is less than 3 mol % preferably. In the heat-shrinkable-properties polyester system film obtained using polyester containing these polyvalent carboxylic acid, it becomes difficult to attain required high contraction.

[0014][as a diol component which constitutes the polyester used by this invention] Alicyclic diol, such as aliphatic series diol;1,4-cyclohexane dimethanol, such as ethylene glycol, propanediol, butanediol, neopentyl glycol, and hexandiol, aromaticdiol, etc. are mentioned.

[0015][the polyester used for the heat-shrinkable-properties polyester system film of this invention] The polyester which made one or more sorts in the diol (for example, propanediol, butanediol, neopentyl glycol, hexandiol, etc.) which has 3-6 carbon numbers contain, and adjusted the glass transition point (Tg) to 60-75 ** is preferred.

[0016]In order to consider it as the heat-shrinkable-properties polyester system film which was excellent in especially contraction result nature, it is preferred to use neopentyl glycol as one sort of a diol component. It is 15-25-mol % preferably (it is below the same to all the diol components to be used).

[0017]As for diol (for example, octanediol etc.) of eight or more carbon numbers, or the polyhydric alcohols (for example, trimethylolpropane, trimethylolethane, glycerol, diglycerol, etc.) more than trivalent, not containing is preferred. It is less than 3 mol % preferably. In the heat-shrinkable-properties polyester system film obtained using polyester containing these diol or a polyhydric alcohol, it becomes difficult to attain required high contraction.

[0018]As for this polyester, it is preferred not to contain diethylene glycol, triethylene glycol, and polyethylene glycol as much as possible. Although especially diethylene glycol exists easily for the subgeneration component at the time of polyester polymerization, it is preferred that the content of diethylene glycol is less than [4 mol %] in the polyester used by this invention.

[0019]The content of the above-mentioned acid component and a diol component is the content to the acid component of the whole polyester, and a diol component, when mixing and using two or more sorts of polyester. In order to raise the smoothability of a heat-shrinkable-properties film to . pan which is not concerned with whether the ester interchange is made after mixing, For example, it is preferred to also make organic lubricant, such as for example, inorganic lubricant, such as titanium dioxide, particle-like silica, kaolin, and calcium carbonate, and long-chain-fatty-acid ester, contain. Additives, such as a stabilizer, a colorant, an antioxidant, a defoaming agent, an antistatic agent, and an ultraviolet ray absorbent, may be made to contain if needed.

[0020]Each above-mentioned polyester polymerizes by the conventional method, and may be manufactured. For example, polyester is obtained using the direct esterification process which carries out the direct reaction of dicarboxylic acid and the diol, the ester interchange method to which dicarboxylic acid dimethyl ester and diol are made to react, etc. A polymerization may be performed by which method of a batch process and a continuous system.

[0021][the heat-shrinkable-properties polyester system film of this invention] In a main shrinkage direction, [warm water contraction of the film which was processed by no load condition in warm water, and was computed from the length before and behind contraction by the formula of heat shrinkage rate =(length after the length-contraction before contraction) (length before /contraction) x100 (%)] In the direction which is 10 to 50% in the treatment temperature of 70 **, and processing time 5 seconds, is 10 to 30% preferably, is not less than 75% in 85 ** and 5 seconds, is 75 to 95% preferably, and intersects perpendicularly with a main shrinkage direction, In 85 ** and 5 seconds, it is 10% or less, is 8% or less preferably, and is 6% or less more preferably.

[0022]In 70 ** and 5 seconds, less than 10% of case runs short of low-temperature contractility, and warm water contraction of a main shrinkage direction needs to make contraction temperature high, and is not preferred. On the other hand, when exceeding 50%, a jump of the label by thermal contraction occurs and it is not desirable.

[0023]Contraction for 85 ** and 5 seconds is 75 to 95% preferably, contraction of the oral region of a bottle becomes insufficient and less than 75% of case does not have it. [preferred] On the other hand, since after heating contraction has the power contracted further when exceeding 95%, a label flies up easily.

[0024]In the heat-shrinkable-properties polyester system film of this invention, the Young's modulus in 10 ** or less (for example, 10 **) after contraction is below $2.3x10^{10}dyn/cm^2$, and is $0.5x10^{10}dyn/cm^2$-$2.3x10^{10}dyn/cm^2$ preferably. When the Young's modulus in 10 ** or less after contraction of a heat-shrinkable-properties polyester system film exceeds $2.3x10^{10}dyn/cm^2$, there is a fault of cutting on the way at the time of perforations opening.

[0025]After immersing the printed film for 2.5 seconds into 80 ** of warm water with Young's modulus here and making it contract, The specimen of 5 mm of 50 mm of longitudinal direction x cross direction is created, product dynamic viscoelasticity measuring device [made from measuring instrument:IT Measurement Division Control] DVA-225 is used, and the rate of dynamic viscoelasticity by which the rise in temperature might be carried out from -10 ** to 50 ** is said.

[0026]As for the heat-shrinkable-properties polyester system film of this invention, it is preferred that the contraction stress in 90 ** is more than 1.0kg[/mm] ^{2}. More than 1.0kg[/mm] ^{2} is less than 3.0kg[/mm] ^{2} still more preferably. When contraction stress is less than 1.0kg [/mm] ^{2}, a shrinkage rate is too slow and may become the shortage of contraction by the oral region of a bottle. If 3.0kg[/mm] ^{2} is exceeded, a void may be produced around the lubricant contained in a film, and the transparency of a film may get worse.

[0027]As for the heat-shrinkable-properties polyester system film of this invention, it is preferred that the compressive strength of the label produced from the film is not less than 300g. It is not less than 400g still more preferably. Although compressive strength is affected by influence with the thickness of a film, it needs to be not less than 300g on high-speed wearing machining, and may produce the problem that label wearing is poor, the case below 300g.

[0028]Although the thickness in particular of the heat-shrinkable-properties polyester system film of this invention is not limited, its 10-200 micrometers are preferred as a heat-shrinkable-properties film for labels, and its 20-100 micrometers are still more preferred.

[0029]Next, although an example is explained about the manufacturing method of the heat-shrinkable-properties polyester system film of this invention, it is not limited to this

manufacturing method.
[0030]It dries using dryers, such as a hopper dryer and a paddle dryer, or a vacuum dryer, and melting of the polyester raw material used for this invention is carried out at the temperature of 200-300 **, and it is extruded in the shape of a film. On the occasion of extrusion, the existing arbitrary methods, such as a T die method and a tubular method, may be adopted. After extrusion, it quenches and an unstretched film is obtained.
[0031]Next, the obtained unstretched film is preferably extended 3.5 or more times 3.0 or more times in a transverse direction (direction which intersects perpendicularly to the extrusion direction) at more than Tg-5 ** of polyester, and the temperature below Tg+15 ** of polyester.
[0032]Next, as occasion demands, it heat-treats at the temperature of 70-100 **, and a heat-shrinkable-properties polyester system film is obtained.
[0033]Not only the width 1 axis extension by a tenter but the thing which it extends to a lengthwise direction additionally and is done for biaxial extension is also possible for the method of extension. Such biaxial extension may often perform [one by one] re-extension in a lengthwise direction or a transverse direction if needed further by any method of the biaxial extending method and the simultaneous biaxial extending method.
[0034]In order to have attained the purpose of this invention, since the transverse direction was practical as a main shrinkage direction, above the example of the method of producing a film, in case a main shrinkage direction is a transverse direction was shown, but. Also when making a main shrinkage direction into a lengthwise direction, the direction of draw in a described method is changed 90 degrees, and also a film can be produced according to operation of a described method.
[0035]It is preferred to extend the unstretched film obtained from polyester at the temperature more than Tg-5 ** and below Tg+15 ** in this invention.
[0036]When it extends at the temperature below Tg-5 **, since the transparency of the film obtained by acquiring the heat shrinkage rate which is constituent features of this invention not only in the stake gets worse, it is not desirable.
[0037]When it extends at the temperature beyond Tg+15 **, the obtained film has the insufficient film waist at the time of high-speed wearing, and since the thickness nonuniformity of a film is spoiled remarkably, it is not preferred.
[0038]As for the heat-shrinkable-properties polyester system film of this invention, it is preferred that the thickness distribution of the film computed from the thickness of the film by the formula of thickness distribution =(maximum thickness-minimum thickness) (/average thickness) x100 (%) is 6% or less. It is 5% or less still more preferably.
[0039]The film in which 6% or less of film exceeded 6% to superposition of a color being easy by 3-color printing carried out, for example at the time of contraction result nature evaluation does not have preferred thickness distribution in respect of superposition of a color.

[0040]In order to make the thickness distribution of a heat-shrinkable-properties polyester system film equalize, When extending in a transverse direction using a tenter, it is preferred to heat until it reaches predetermined film temperature at low wind velocity in the preheating process carried out in advance of a stretching process so that a coefficient of heat transfer may become in below 0.0013 calorie [/cm] ^{2}, sec, and **.
[0041]In order to control the internal heat build-up of the film accompanying extension and to make the film temperature spots of a cross direction small, the coefficient of heat transfer of a stretching process has [more than 0.0009 calorie //cm / ^{2}, sec, and **] the preferably good conditions of 0.0011-0.0017 calorie [/cm] ^{2}, sec, and **.
[0042]When the coefficient of heat transfer of a preheating process exceeds 0.0013 calorie [/cm] ^{2} and sec, When the coefficient of heat transfer in a stretching process is less than 0.0009 calorie [/cm] ^{2} and sec and thickness distribution carries out polychromic printing processing of the film obtained by being hard to become uniform, a gap of a pattern takes place by multicolor superposition, and it is not desirable.
[0043]
[Working example]Hereafter, although an working example explains this invention still more concretely, this invention is not limited to these working examples, unless the gist is exceeded.

[0044]The valuation method of the film of this invention is as follows.
[0045](1) The heat shrinkage rate film was cut out in square of 10 cm x 10 cm, after carrying out specified time treatment and carrying out thermal contraction by no load condition into warm water with a prescribed temperature of **0.5 **, the length of a film and the size of the transverse direction were measured, and the heat shrinkage rate was searched for according to following the (1) type, respectively. The large direction of this heat shrinkage rate was made into the main shrinkage direction.
[0046]
Heat shrinkage rate =(length after the length-contraction before contraction) (length before /contraction) x100 (%) (1) [0047](2) On the contraction result nature heat-shrinkable-properties film, 3 colors was beforehand printed in the grass and gold, and the white ink of TOYO INK MFG. CO., LTD.
[0048]Using the steam tunnel made from Fuji Astec Inc (form: SH-1500-L), [for pass time 2.5 seconds] [the zone temperature of 80 **] It tested using a 334-ml glass bottle (190 cm in height, and central part 6.9 cm in diameter) (bottle currently used for SUTAI knee Super Dry of Asahi Breweries, Ltd.) (number of measurement =20).
[0049]Evaluation was performed visually and the basis was carried out as follows.
[0050]

A wrinkle, a jump, and all with insufficient contraction are un-generating. : O A wrinkle, a jump, or the shortage of contraction occurs. : x [0051](3) compressive strength -- it printed on the heat-shrinkable-properties film as mentioned above, and 108 mm of lay flat width and a label 196 mm in length were produced. This label was refolded, the bottom produced the square cylinder and the bottom measured the compressive strength of the up-and-down direction of this cylinder.

[0052]The maximum of the compressive strength (g) for crosshead speed 200mm/was measured by compressed mode using the straw graph (form :V10- C) of Make [machine / Oriental energy] (sample size =5).

[0053](4) Tg (glass transition point)

It asked for 10 mg of unstretched films using DSC by SEIKO Electronic industry (form: DSC220) from the endothermic curve obtained by carrying out a rise in temperature by a part for heating-rate/of 20 ** from -40 ** to 120 **. The tangent was drawn before or after the point of inflexion of an endothermic curve, and the intersection was set to Tg (glass transition point).

[0054](5) Using the contact thickness gage by thickness distribution ANRITSU CORP. (form: KG60/A), the thickness of the sample of 5 cm of lengthwise directions and 50 cm of transverse directions was measured (number of measurement =20), and thickness distribution (variation in thickness) was searched for by following the (3) type about each sample. The average (n= 50) of this thickness distribution was evaluated in accordance with the following basis.

[0055]

Thickness distribution =(maximum thickness-minimum thickness) (/average thickness) x100 (%) (3)

6% [ ] or less -- -> O6% -- large -- less than 10% -> **not less than 10% -> x [0056](6) Using Product Tensilon [made from a contraction stress Oriental energy machine] (with heating furnace) Strong ductility measuring apparatus, from a heat-shrinkable-properties film, start a sample 200 mm in length of a main shrinkage direction, and 20 mm in width, and, [the distance between zippers of 100 mm] Ventilation was stopped in the atmosphere beforehand heated at 90 **, the sample was attached to the zipper, the contraction stress detected when the door of an electric furnace is shut promptly after that and ventilation is started was measured, and the maximum which can be found from a chart was made into contraction stress (kg/mm^2).

[0057](7) On the Young's modulus heat-shrinkable-properties film, 3 colors was beforehand printed in the grass and gold, and the white ink of TOYO INK MFG. CO., LTD.

[0058]Next, after making it contract by immersing this printed film for 2.5 seconds into 80 ** of warm water, The specimen of 5 mm of 50 mm of longitudinal direction x cross direction was created, product dynamic viscoelasticity measuring device DVA[made from measuring instrument:IT Measurement Division Control]-225 was used, and the rate of dynamic

viscoelasticity by which the rise in temperature might be carried out from -10 ** to 50 ** was made into Young's modulus.

[0059]The polyester used for the working example is as follows.

[0060]Polyester A: Polyethylene terephthalate (limiting viscosity (IV)0.75 dl/g)

Polyester B: Polyester which consists of ethylene glycol 70 mol %, neopentyl glycol 30 mol %, and terephthalic acid (IV 0.72 dl/g)

Polyester C: Polybutylene terephthalate (IV 1.20 dl/g)

Polyester D: Polyester which consists of butanediol 85 mol %, polytetramethylene glycol 15 mol %, and terephthalic acid (IV 1.50 dl/g)

[0061](Working example 1) Melting of the polyester which mixed polyester A10.5 weight %, polyester B75 weight %, polyester C10 weight %, and polyester D4.5 weight % was carried out at 280 **, it was extruded from the T-slot die, it quenched with the chilled roll, and the unstretched film was obtained. Tg of this unstretched film was 70 **.

[0062]After carrying out preheating of this unstretched film until film temperature became 85 **, it was extended 4.47 times at 73 ** in the transverse direction by the tenter. Subsequently, it extended further 1.1 times, heat-treating for 10 seconds at 73 ** (the sum total of draw magnification is 4.47x1.1=5.1), and the 50-micrometer-thick heat-shrinkable-properties polyester system film was obtained.

[0063](Working example 2) Melting of the polyester which mixed polyester A10.5 weight %, polyester B85 weight %, and polyester D4.5 weight % was carried out at 280 **, it was extruded from the T-slot die, it quenched with the chilled roll, and the unstretched film was obtained. Tg of this unstretched film was 70 **.

[0064]After carrying out preheating of this unstretched film until film temperature became 84 **, it was extended 4.47 times at 74 ** in the transverse direction by the tenter. Subsequently, it extended further 1.1 times, heat-treating for 10 seconds at 74 **, and the 50-micrometer-thick heat-shrinkable-properties polyester system film was obtained.

[0065](Working example 3) Melting of the polyester which mixed polyester A15 weight % and polyester B85 weight % was carried out at 280 **, it was extruded from the T-slot die, it quenched with the chilled roll, and the unstretched film was obtained. Tg of this unstretched film was 71 **.

[0066]After carrying out preheating using this unstretched film until film temperature became 84 **, it extended 4.47 times at 74 ** in the transverse direction by the tenter. Subsequently, it extended further 1.1 times, heat-treating for 10 seconds at 74 **, and the 50-micrometer-thick heat-shrinkable-properties polyester system film was obtained.

[0067](Comparative example 1) The 50-micrometer-thick heat-shrinkable-properties polyester system film was obtained like the method indicated in the working example 3 using polyester of the same presentation as the working example 3 except draft temperature having been 80 **.

[0068](Comparative example 2) Melting of the polyester which mixed polyester A15 weight %, polyester B75 weight %, and polyester C10 weight % was carried out at 280 **, it was extruded from the T-slot die, it quenched with the chilled roll, and the unstretched film was obtained. Tg of this unstretched film was 70 **.

[0069]After carrying out preheating of this unstretched film until film temperature became 85 **, it was extended 4.47 times at 83 ** in the transverse direction by the tenter. Subsequently, it extended further 1.1 times, heat-treating for 10 seconds at 83 **, and the 50-micrometer-thick heat-shrinkable-properties polyester system film was obtained.

[0070](Comparative example 3) Melting of the polyester which mixed polyester A40 weight %, polyester B50 weight %, and polyester C10 weight % was carried out at 280 **, it was extruded from the T-slot die, it quenched with the chilled roll, and the unstretched film was obtained. Tg of this unstretched film was 69 **.

[0071]After carrying out preheating of this unstretched film until film temperature became 84 **, it was extended 4.47 times at 77 ** in the transverse direction by the tenter. Subsequently, it extended further 1.1 times, heat-treating for 10 seconds at 77 **, and the 50-micrometer-thick heat-shrinkable-properties polyester system film was obtained.

[0072](Comparative example 4) Melting of the polyester which mixed polyester A15 weight %, polyester B60 weight %, and polyester C25 weight % was carried out at 280 **, and it extruded from the T-slot die, it quenched with the chilled roll, and the unstretched film was obtained. Tg of this unstretched film was 62 **.

[0073]After carrying out preheating of this unstretched film until film temperature became 83 **, it was extended 4.47 times at 70 ** in the transverse direction by the tenter. Subsequently, it extended further 1.1 times, heat-treating for 10 seconds at 70 **, and the 50-micrometer-thick heat-shrinkable-properties polyester system film was obtained.

[0074](Comparative example 5) Melting of the polyester which mixed polyester A15 weight %, polyester B75 weight %, and polyester C10 weight % was carried out at 280 **, and it extruded from the T-slot die, it quenched with the chilled roll, and the unstretched film was obtained. Tg of this unstretched film was 70 **.

[0075]After carrying out preheating of this unstretched film until film temperature became 83 **, it extended 4 times at 78 ** in the transverse direction by the tenter, and the 50-micrometer-thick heat-shrinkable-properties polyester system film was obtained.

[0076]The evaluation result of the film obtained by the working examples 1-3 and the comparative examples 1-5 is shown in Table 1.

[0077]

[Table 1]

	原料系			
	ポリエステルA	ポリエステルB	ポリエステルC	ポリエステルD
実施例 1	10.5	75	10	4.5
2	10.5	85	0	4.5
3	15	85	0	0
比較例 1	15	85	0	0
2	15	75	10	0
3	40	50	10	0
4	15	60	25	0
5	15	75	10	0

	製膜条件		収縮率、5秒		収縮応力	厚みむら	圧縮強度	環境	低温ヤング率
	延伸温度	延伸倍率	70℃	85℃	(kg/mm²)		(g)	仕上げ性	*
実施例 1	73	5.1	52.0	77.0	1.5	○	500	○	2.1
2	74	5.1	41.0	77.0	2.2	○	480	○	2.2
3	74	5.1	34.0	77.0	2.2	○	500	○	2.2
比較例 1	80	5.1	15.0	78.5	2.2	○	550	○	2.4
2	83	5.1	19.0	75.0	0.9	×	320	○	2.4
3	77	5.1	20.0	70.0	1.2	○	520	×	2.5
4	70	5.1	40.0	72.0	0.8	△	290	×	2.4
5	78	4.0	17.0	74.0	1.1	○	450	×	2.4

ポリエステルA：TPA//EG=100//100(mol%)
ポリエステルB：TPA//EG/NPG=100//70/30(mol%)
ポリエステルC：TPA//BD=100//100(mol%)
ポリエステルD：TPA//BD/PTMG=100//85/15(mol%)
*印刷後輸後5℃：(E÷10 dyn/cm²)

TPA:テレフタル酸
EG:エチレングリコール
NPG:ネオペンチルグリコール
BD:ブタンジオール
PTMG:ポリテトラメチレングリコール

[0078]Each film obtained in working examples 1-3 had good contraction result nature so that clearly from Table 1. Thickness distribution was also good. For high quality, the heat-shrinkable-properties polyester system film of this invention has high practicality, and it is preferred for it especially as an object for shrink labels.

[0079]On the other hand, the heat-shrinkable-properties film obtained by the comparative example 2 was inferior in thickness distribution. By contraction, a wrinkle and the shortage of contraction occurred and, as for the heat-shrinkable-properties film obtained by the comparative examples 3, 4, and 5, all were inferior in contraction result nature. Thus, each heat-shrinkable-properties polyester system film obtained by the comparative example was inferior in quality, and its practicality was low.

[0080]

[Effect of the Invention]According to this invention, the suitable heat-shrinkable-properties polyester system film for the object for the labels of a full bottle, especially the labels of a glass full bottle is obtained.

[0081]Good result nature with very few developments with insufficient wrinkle by thermal

contraction, contraction spots, distortion, and contraction is possible for it, and the heat-shrinkable-properties polyester system film of this invention is very useful for a full bottle label use, when using it as a full bottle label.

[Translation done.]